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Machine Translation of DE 10029171

**Herstellungssystem**

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## Abstract of DE 10029171 (A1)

The invention relates to a system for carrying out the machine production of pretzels. Said system comprises a device for feeding U-shaped strands of dough into a shaping unit located downstream therefrom. The shaping unit is configured for holding the fed U-shaped strands of dough and for working the same into a pretzel blank. The system also comprises a pretzel blank removal device assigned to an exit of the shaping unit, and comprises a gripping device which is configured for grasping or holding the ends of the strands of dough outside and/or inside the shaping unit, and which can linearly travel along a conveying device for strands of dough and pretzel blanks between a supply device and a removal device and in a transversal direction thereof. The system is provided with means for tying a pretzel knot from the limb sections of the U-shaped strand of dough located in the shaping unit, whereby the gripping device and the tying means can be controlled by a control. The shaping unit is provided with dough strand positioning means which can be linearly driven and guided in and counter to the direction of conveyance, and which can be controlled by the control. Said positioning means enable the strand of dough or the pretzel blank to be completely or partially displaced in and counter to the direction of conveyance with regard to the gripping device which holds the ends of the strands of dough. The control is coupled on the input side to signal transmitters which report the position of the strand ends, of the gripping device and/or of the tying means, and is coupled on the output side to the linear drive for the positioning means in order to control the same.

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The invention relates to a machine, automatic Brezelherstellungssystem, which agent exhibits for the supply of u-shaped paste strands into a downstream form unit, which is for holding the supplied, u-shaped paste strand and formed to its processing to a Brezelrohling. Furthermore the system exhibits the output of the form unit an associated Brezelrohling discharge equipment as well as gripping means, which for seizing or holding the paste strand ends from and/or in the form unit formed and along a paste strand and a Brezelrohling conveying direction, which are more linear more movable between and discharge equipment extended, and along a transverse direction in addition. Furthermore the Brezelherstellungssystem agent exhibits to loops of a Brezelknotens from leg portions of the u of förmigen paste strand located in the form unit. The gripping means and the bolting means are more controllable by a control. Furthermore the invention concerns a combined seizing and bolting device, a form unit as well as bolting means, which are suitable for the Brezelherstellungssystem according to invention formed and in each case.

From DE 198 07 692 A1 and EP 0,938,844 A1 is a Brezelschlingssystem known, with which supply means with a conveyor belt use find, on whose surface a motor rotatable arranging wheel with crosswise rising axis of rotation disposed and is take offable. To it required paste strands of bottom receipts of an U shape come into plant and become with lifting of the smelling trade the reforwarding released. The arranging wheel is an angle sensor to the detection of its turning way and the u-shaped bent paste strand a sensor technology to the separate recognition per one of its two ends associated. The drive motor of the smelling trade becomes controlled by control means, which are input connected with the angle sensor and the sensor technology. Furthermore the before-known Schlingssystem two of the supply means exhibits downstream form units. These become in such a manner operated in the Gegentakt that the first form unit of a covering position becomes direct staggered into the delivery position, while the simultaneous second form unit becomes reverse staggered direct of the delivery position into the covering position. With this Schlingssystem a very high production rate can be obtained, however are the structure, the construction and the operation mode expensive.

From DE 44 30 172 A1 is a mechanism to the production of Brezel known, which a bolting machine exhibits. Paste strands with a short length become, thus a smaller length than the target length used. The paste strands become deposited on the saddle of a receiving plate, which becomes moved into an uppermost position. The two down-suspended legs interrupt thereby first one stationary disposed light barrier each, which steer one gripper disposed in defined distance above the light barriers each. The grippers which are on the same level are in more vertical and horizontal direction more displaceable as well as around horizontal axis more rotatable. With increased movement of the receiving plate the light barrier recognizes the strand end upward and the associated grippers becomes closed. By this control of the grippers achieved becomes that both end portions of the paste strand in precise equal distance of the strand end become detected, even if the paste strand should not be precise symmetrical deposited on the receiving plate. After the two grippers have the two end portions of the paste strand detected, the receiving plate becomes still so far upward moved that the length of the paste strand of the first present undersize becomes brought on the nominal dimension. In all other respects a variety of single, successively disposed stations proposed for the bolting procedure and the production of a Brezelrohling, which the time and construction expenditure increased, becomes.

From DE 41 05 254 c1 is an apparatus to loops of a Brezel from a straight paste strand known, which must be however defined length. The apparatus exhibits a support to the receptacle of the paste strand, which is take offable from an horizontal position. Up a double-armed lever is disposed, which is more pivotal around a vertical axis. The respective free end of the double-armed lever moved itself in an arc in an horizontal plane. Furthermore two einarmige levers are provided, which are pivotally connected with a lever arm of the double-armed lever arm in each case and are more pivotal around an axis inclined from the vertical one essentially. In the range the pivotal axis of opposite end a gripping member is mounted. The production of the double-armed lever with additional two einarmigen levers is in particular expensive due to bends and oblique angles expensive and.

With a known Brezel forming device about that initially mentioned type (WHERE 94/03 068) becomes as form unit a cast shell used, in whose bowl soil at least one groove or groove with one is the Brezelform corresponding, prolonged bolted and/or bent course formed. Into this cast shell paste strands become inserted by means of gripping means. In addition the gripping means two per a paste strand end prove associated grippers, which are more movable in the three orthogonal space axes. However difficult thereby transferring of the first rectilinear paste strand is into the cast shell in brezelgenauer alignment. This places high demand at the quality and the precision of the grip arm guides. Loops of the Brezelknotens through tricks of the cast shell accomplished becomes, according to which the paste strand ends of the grippers, which are away from the node, become printed by vertical methods on the bent central portion of the Brezelrohling. Thereupon the cast shell becomes swung toward to a discharge equipment, which however to

falling out and/or. Out centrifuges of the Brezelrohllings and a consistent form Impairment leads.

The invention is the basis the object to increase with a Brezelschlingensystem bottom achievement of an increased reliability the reproducibility and constant precision of the Brezelform to simplify and standardize as well as the courses of motion for gripping means and/or form unit. So that accompanying the manufacture and operating cost of a such Brezelherstellungssysteme are to become reduced and the operability simplified. Besides the employment flexibility should be regarding processability of paste watering gene different length increased in particular.

The solution proposed according to invention become with the Brezelherstellungssystem with the features initially specified that the form unit is provided also in and against the conveying direction linear drivable and led paste strand positioning means controllable of the control. With these the paste strand or the finished formed Brezelrohlling can be induced completely or partly opposite that the paste strand ends held gripping means in and against the conveying direction, in particular to stretch or transport purposes. Thereby the control is according to invention with signal transmitters, those on the position of the strand ends, the gripping means and/or the bolting means based is input and/or. respond, and at the output with the linear drive for the positioning means to its control coupled. Thus will over simple and inexpensive as well as clearly producible construction and resource the possibility provided to stretch for example to short paste strands on the proper length or to support also the gripping means with loops and surrounding of the paste strand ends on the Brezel middle part. The invention can be realized with uniform linear drives and linear guides inexpensive. Simultaneous one is the maintenance and concomitantly the availability opposite the state of the art increased. By one with the inventive system preshaped Brezelstränge also different length a stretch and/or. elongation to give can, can also to the requirement be met that the Brezelknoten with finished loops fixed closed remains. This is important, since with the subsequent Belagungsprozess the caustic solution is not to penetrate into the closed node. This would reduce the quality and the appearance of the Brezel.

With the conventional Brezelherstellungsverfahren the varied length of the paste strand. Opposite the invention opens the possibility, by different elongations, which can be programmed over a free programmable controller for example to manufacture Brezelrohllinge constant size. This can take place in particular via the fact that becomes exerted with short Brezelsträngen a larger elongation than with longer. According to invention becomes this by it achieved that the form unit, in which the Brezel is with loops in particular the held is due to its linear drives in its layer variable. An advantage achievable with the invention consists of the fact that the entire Brezelrohlling manufacturing process in the form unit can run off, and besides the Brezelrohlling is more movable for discharge equipment by the positioning means. Thus the load on the Brezelstrang and a deformation of the finished bolted Brezelrohllings are reduced.

In the frame also a form unit with positioning means, which cover in or several conveyor belts and in or several with this cooperative and/or structural integrated support body, is appropriate for the general inventive idea, whereby both the conveyor belts and the retaining means are in or against the conveying direction linear guided. After a particularly favourable formation several such conveyor belts are next to each other longitudinal disposed, and the support bodies, in particular performed as retaining pins, jump between them toward to the paste strand forwards, around this to hold too. With the fact it is convenient that the support bodies with the linear drive mentioned are connected to the movable in and against the conveying direction.

In the scope of the invention also a combined seizing and bolting device lie, whereby the gripping means and the bolting means are structural and/or functional integrated with one another. The gripping means possess two, per an end, of the u-shaped paste strand of associated grab organs located in the form unit, which are disposed at a common turning yoke. This is more movable by of the control controllable a rotary drive more rotatable and in the transverse direction of and to that form unit located paste strand more linear. Thus the Telgsirangenden over drive of the rotary drive can become with one another the formation of the node devoured and afterwards on the bent central portion of the Brezelrohllings pressed.

Furthermore in the frame bolting means for the manufacture system mentioned, which are characterised through on an height between the form unit and the gripping means propelled and up and apart-conductible bolting guiding devices, are appropriate for the general inventive idea. For example those facing ends of the bolting guiding devices are in such a manner clammy-like formed each other that they are suitable for covering, circumscription or clasping of the paste strand leg portions with their bolting procedure.

Fig. 1 side view of the Schlingensystems according to invention,

Fig. 2 plan view on the form table 2 with partial view of the rotating head 24 in accordance with section A-A, Fig. 1, gripper 34 in swung position shown,

Fig. 3 plan view on the form table 2 with partial view of the fingers 39, 40 and 41, 42 the gripper 34 and 35 of a Brezelstranges not seized yet,

Fig. 4 plan views on the form table 2 with that, by the fingers 39, 40 and 41, 42, seized Brezelstrangenden 36b,

Fig. 4b plan view on the form table 2 with illustration of the completed extension procedure around the measure D,

Fig. 5 plan view on the form table 2 with closed guides 14 and 15 and Brezelstrang with omega form,

Fig. 6 side view of the Schlingensystems in accordance with Fig. 5,

Fig. 6 plan view on the form table 2 with formed nodes and opened guides 14, 15,

Fig. 6a side view of the Schlingsystems with different of Fig. 6 represented rotating head 24 around 90 DEG rotated,

Fig. 7 plan view on the form table 2 with finished Brezelrohling,

Fig. 7a side view of the Schlingensystems in accordance with Fig. 7 with illustration of the opened fingers and driven out plunger 49 to the deposition of the Brezelstrangenden 36b on the Brezel(mitteln) 36a,

Fig. 8 plan view on the form table 2 and Intermediate table 18 Brezelstrang 36 of supply means 1, bent with finished Brezelrohling 45, as well as new incoming u-shaped,

Fig. 8a side view of the form table 2 with intermediate table 18 and partial view of the delivery system 1, as well as brought in retaining pins 5, in accordance with Fig. 8,

Fig. 9a/b plan views on form table 2 with the Brezelform 6 adjusted around the measure  $e$ .

In Fig. 1 is the Brezelschlingsystem in the side view shown. The used supply means 1, for bending, measuring and aligning the u-shaped paste strands are from the patent applications DE 198 07 692,4 and EP 99103614,6 known. The other Brezelschlingsystem essentially consists of the form table 2, its conveyor belt 2 of narrow conveyor belt 3 and wide conveyor belts 4 consists. By the free spaces of the conveyor belt 2 the retaining pins 5 the Brezelform 6 rise up. The Brezelform 6 with the retaining pin 5 is on a lifting cylinder 7 mounted, over that the retaining pins 5 toward 8 Fig. 8a into the form table 2 is concealable. The Brezelform 6 is 9 fixed mounted on a guidance car. The guidance car 9 is 50 connected fixed in the range with the toothed belts 10 and becomes by the drive motor 11 driven. Over the drive elements the Brezelform 6 in the directions 12 and 13 can 10, 11 and the guidance car 9 be moved. Above the form table 2 the guides 14 and 15 are in Fig transverse to the conveying direction. 2, with the lifting cylinders 16 and 17. After the form table 2 are the intermediate table 18 with the conveyor belt 18a and the exhausting table 19 with the conveyor belt 19a. At the beginning of the conveyor belt 18 is transverse to the running direction 51 the sensors 20 and 21. Above the form table 2 and the intermediate table 18 is the bolting device 22 essentially consists of the horizontal guidance 37 with the lifting cylinder 25, the vertical guidance 28 with the two position cylinders 26 and 27, the rotary drive 29 with the turning guidance 52 and the rotary knob 24. Agent of the holding member 23 the vertical guidance can become 28 with the cylinders 26 and 27, the rotary drive 29, the rotating head 24 common over the horizontal drive 37 and the lifting cylinder 25 in horizontal direction moved. The rotating head 24 can become with the lifting cylinders 26 and 27 and the linear guide 28 in vertical direction adjusted. Agent of the rotary drive 29 the rotating head can become 24 around the vertical axis 30 around 360 DEG rotated. The rotating head 24 consists the grippers 34 and 35, by means of the rotary drives 38, 39 33 disposed pivotal around the vertical axes 32 and at the upper end of an yoke 31 at its two ends is, sees Fig. 2.

The u-shaped Brezelstrang 36 in Fig. 1, coming from the supply means 1, is handed over to that by means of the conveyor belts 3 and 4 on the form table 2, to middle part 36a of the Brezelstranges 36 at the retaining pins 5 the Brezelform 6 in accordance with Fig. 1 lies close to 3. In addition the Brezelform 6 is in the extreme right position direction 13, and the retaining pins 5 in highest position. As in Fig. 3 rests upon thereby the Brezelstrangenden 36b on the intermediate table 18 and has thereby the sensors 20 and 21 passed. Simultaneous one becomes the rotating head 24 with the grippers 34 and 35 by the extension of the two lifting cylinders 26 and 27 into the deepest position, direction 38, adjusted. The fingers 39 and 40 of the right gripper 35 and the fingers 41 and 42 of the left gripper 34 in the range 46 between the form table 2 come and the intermediate table 18 to lying. Thus safe seizing of the Brezelstrangenden becomes ensured. By moving the retaining pins 5 with the Brezelform 6 by means of the drive elements 9, 10, 11 toward 12 the Brezelstrang will not any longer recognize 36 42 to the sensors 20 and 21, the Brezelstrangenden 36b pulled by the fingers 39, 40 and 41. Over the sensor 20, and a not represented control, the fingers 39, 40 of the right gripper 35 become reasoning, seizing and holding the Brezelstrangenden 36b driven. The same applies to the sensor 21 with the gripper 35, see Fig. 4. Thus also parallel opposite strand ends of 36b independent and single from each other prolonged-precise cannot be seized. After seizing the strand ends 36b the paste strand becomes on an adjustable measure D, in accordance with Fig. 4a, stretched. After stretching the paste strand the subsequent movements become partially superposed performed.

In addition the bolting mechanism becomes 22 with the rotating head 24 by drawing the cylinders 26 and 27 toward 47 lifted and by the extension of the cylinder 25 toward 48 moved, until the Schlingsystem 22 as into Fig. 6 the shown position to loops of the node achieved has. By the extension of the cylinders 16 and 17 and closing of the guides 14 and 15 the Brezelstrang the form of an omega given, Fig. 7 becomes. 5. Thus the formation of the node is improved and bringing the Brezelstranges 36 from the retaining pins 5 prevented out. With the rotary drives 38 and 39 is course-swivelled one on the other the grippers 34 and 35 around the vertical axes of rotation 32 and 33 toward 43 and 44, Fig. 2. The gripper 35 with the fingers 39 and 40 and the gripper 34 with the fingers 41 and 42 become so far swung thereby, to this in each case a right angle with the strand ends of 36b of the finished bolted Brezel 45 form Fig. 7.

Now the rotating head becomes 24 over the rotary drive 29 around the pivotal axis 30 the formation of the node around 360 DEG, in accordance with Fig. 6/6a, rotated. After forming the node the guides become 14 and 15 by the retraction of the lifting cylinders 16 and 17 in accordance with Fig. 6 opened. So that the Brezelstrangenden 36b at the predetermined position of the Brezel deposited will through adjust to become to be able, the Brezelstrang for 36 via the drive elements 9, 10, 11, the retaining pins 5 with the Brezelform 6 by mass in accordance with Fig. 9a/b to the right toward 13 moved. By the extension of the lifting cylinder 27 toward 38 and opening the fingers 39, 40 and 41, 42 and the extension of the plungers 49 between the fingers the ends of the Brezelstranges 36b become on the paste strand center section 36a pressed, see Fig. 7a. The Brezelrohling 45 is now finished. The further transport the retaining pins become 5 by means of the stroke drive 7 from the Brezelrohling 45 toward 8 withdrawn and by retraction of the lifting cylinder 27, toward 48, released. The Brezelrohling 45 becomes 19 carried by means of the conveyor belts 3, 4, 18a the subsequent treatment on the exhausting table, Fig. 8a. Simultaneous one is taken over a new Brezelstrang 36 by the feed unit 1 on the form table 2, in accordance with Fig. 8. The bolting mechanism 22 with

the rotating head 24 and the grippers 34 and 35, as well as the retaining pins 5 with the Brezelform 6 become the receptacle of the next and/or. new Brezelstranges into the home position, in accordance with Fig. 1, driven.

#### Reference symbol list

- 1 supply means
- 2 form table
- 2a conveyor belt
- 3 narrow conveyor belt
- 4 wide conveyor belt
- 5 retaining pin
- 6 Brezelform
- 7 lifting cylinders for retaining pin
- 8 (vertical) direction for retaining pin
- 9 guidance cars
- 10 toothed belts
- 11 drive motor
- 12 direction
- 13 direction
- 14 guide
- 15 guide
- 16 lifting cylinders
- 17 lifting cylinders
- 18 intermediate table
- 18a conveyor belt
- 19 exhausting table
- 19a conveyor belt
- 20 sensor
- 21 sensor
- 22 bolting device
- 23 holding member
- 24 rotating head
- 25 lifting cylinders
- 26 position cylinders
- 27 position cylinders
- 28 vertical guidance
- 28a linear guide
- 29 rotary drive
- 30 vertical axis
- 31 yoke
- 32 vertical axis
- 33 vertical axis
- 34 grippers
- 35 grippers
- 36 Brezelstrang
- 36a middle part
- 36b strand end
- 37 horizontal guidance
- 38 rotary drive
- 38a direction
- 39 rotary drive
- 39a Greiferfinger
- 40 Greiferfinger
- 41 Greiferfinger
- 42 Greiferfinger
- 43 direction
- 44 direction
- 45 Brezelrohrhling
- 46 range
- 47 direction
- 48 direction
- 49 plungers
- 50 range
- 51 running direction
- 52 turning guidance
- D stretch process
- e movement measure

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Claims of DE10029171

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## Result Page

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1. System to the machine Brezelherstellung, with a mechanism (1) to the supply of u-shaped paste strands (36) into a downstream form unit (2), which for holding the supplied u-shaped paste strand (36) and to its processing to a Brezelrohling (45) formed is, with an output of the form unit (2) an associated Brezelrohling discharge equipment (18, 19), with gripping means (34, 35), those for seizing or holding the Teigsrangenden (36b) from and/or in the form unit (2) formed and along a paste strand and a Brezelrohling conveying direction (51) between and discharge equipment (1; 18, 19) and a transverse direction (38, 47) in addition is more linear more movable, and with agents (22, 29, 30) to loops of a Brezel node from leg portions of the u-shaped paste strand (36), located in the form unit (2), whereby the gripping means (34; 35) and the bolting means (14-17; 22, 29, 30) of a control more controllable is, characterised in that the form unit (2) also in and against the conveying direction (51) linear drivable (10, 11) and led (9), from the control controllable paste strand positioning means (3, 4; 5) is provided, by means of which the paste strand (36) or the Brezelrohling (45) is whole or partial opposite that the paste strand ends (36b) of held gripping means (34, 35) in and against the conveying direction (51) more movable, whereby the control entrance-laterally with signal transmitters, those on the position of the strand ends (36b), which gripping means (34, 35) and/or the bolting means (22, 29, 30) based are, and at the output with the linear drive (10, 11) for the positioning means (3, 4; 5) to its drive coupled is.
2. System of claim 1, characterised in that the control with a paste strand modulus of elongation (D) is more adjustable, in accordance with which when seizing the paste strand ends (36b) by the gripping means (34, 35) the linear drive (10, 11) of the positioning means (3, 4; 5) for stretching and/or shifting the paste strand (36) toward (12) away gripping means held of that the paste strand ends (36b) (34, 35) is controllable.
3. System of claim 1 or 2, characterised in that the control with a paste strand shifting measure of (D) is more adjustable, in accordance with which after completion of the node by the bolting means (22, 29, 30) the linear drive (10, 11) of the positioning means (3, 4; 5) for shifting and/or shifting the paste strand (36) toward (13) gripping means held to that the paste strand ends (36b) (34, 35) it are in such a manner more movable that the paste strand ends (36b) are put onable by a displacement of the gripping means (34, 35) in the transverse direction (38) on the top other paste strand (36a).
4. Form unit (2) for system after one of the preceding claims, characterised in that the positioning means (3, 4; 5) or several conveyor belts (3, 4) and or several, with this cooperative and/or structural integrated support body (5) cover, whereby those or the conveyor belts (3, 4) and/or support body (5) in or against the conveying direction linear guided are.
5. Form unit (2) according to claim 4, whereby several such conveyor belts (3, 4) are in the distance next to each other longitudinal, and between them a plurality of the support bodies (5) such projected disposed that the latters for the bent portion (36a) of the u-shaped paste strand (36) form or for, the roundish central portion of the Brezelrohling distinguished from the node a mounting plate saddle, characterised in that the support bodies (5) of the linear drive (10, 11) in and against the conveying direction (51) guided are.
6. Combined seizing and bolting device for a system after one of the preceding claims, characterised in that the gripping means (34, 35) and the bolting means (22, 29, 30) structural and/or functional integrated with one another are, by the gripping means (34, 35) two, ever an end of the u-shaped paste strand of associated grab organs (39a, 40) located in the form unit; 41) exhibits, which disposed at a common turning yoke (31) are, from a rotary drive (29), controllable of the control, more rotatable and in the transverse direction (38, 47) of and to the paste strand (36), located in the form unit (2), more linear more movable.
7. Apparatus according to claim 6, characterised in that the turning yoke (31) for the grab organs (39a, 40; 41), that exhibits two fixing points, which are in a distance from each other disposed the distance of the ends of the u-shaped one, in which form unit (2) of located paste strand (36) corresponds.
8. Apparatus according to claim 6 or 7, characterised by an in such a manner led turning yoke (31) that its axis of rotation (30) runs exclusive transverse to the upper and/or edition side of the form unit (2).
9. System after one of the preceding claims, characterised in that in an initial phase the linear drive (10, 11) of the positioning means (3, 4; 5) by the control it is in such a manner controllable that the ends (36b) of the paste strand

(36) on the discharge equipment (18, 19), located in the form unit (2) u-shaped, come to the support, and in a later phase the linear drive (10, 11) of the positioning means (3, 4; 5) by the control it is in such a manner controllable that the ends (36b) of the paste strand (36) of the discharge equipment (18, 19) become the form unit (2) pulled, whereby by the control the gripping means (34, 35) are in such a manner controllable that if the paste strand ends (36b) detected, if their position between the form unit (2) and the discharge equipment (18, 19) are more detectable.

10. System of claim of 9, characterized through sensor means connected with the input of the control (20, 21), which are in the range between the output of the form unit (2) and the input of the exhausting unit (18, 19) formed to the recognition of the paste strand ends (36b) disposed and.

11. Bolting means (14-17; 22; 29, 30) for a system after one of the preceding claims, characterized by more linear transverse to the conveying direction (51) between the form unit (2) and the gripping means (34, 35) propelled (16, 17) and up and apart-conductible bolting guiding devices (14, 15), which are formed for covering, circumscription or claspings of the paste strand leg portions (36b) with the bolting procedure.

12. System after one of the preceding claims, characterized in that the discharge equipment (18, 19) an intermediate table (18) with conveyor belt (18a), whose input the output the form unit (2) more immediate faces, and a downstream exhausting table (19) with conveyor belt (19a) exhibits, whereby the conveyor belt (18a) of the intermediate table (18) is formed to the operation with different speeds.

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Human Translation of Claims of DE 10029171

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(54) **BREZELHERSTELLUNGSSYSTEM**

PRETZEL PRODUCTION SYSTEM

SYSTEME DE PRODUCTION DE BRETZELS

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12. Vorrichtung nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, dass die Greifeinrichtung (34,35) und die Schlingmittel (22,29,30) baulich und/oder funktionell miteinander integriert sind, indem die Greifeinrichtung (34,35) zwei, je einem Ende des in der Formeinheit befindlichen U-förmigen Telgstrangs zugeordnete Greiforgane (39a,40;41) aufweist, die an einem gemeinsamen Drehjoch (31) angeordnet sind, das von einem von der Steuerung kontrollierbaren Drehantrieb (28) drehbar und in der Querrichtung (39,47) von und zu dem in der Formeinheit (2) befindlichen Telgstrang (36) linear verfahrbar ist.
13. Vorrichtung nach Anspruch 12, **dadurch gekennzeichnet**, dass das Drehjoch (31) für die Greiforgane (39a,40;41,42) zwei Befestigungselemente aufweist, die in einem Abstand voneinander angeordnet sind, der dem Abstand der Enden des U-förmigen, in der Formeinheit (2) befindlichen Telgstrangs (36) entspricht.
14. Vorrichtung nach Anspruch 12 oder 13, **gekennzeichnet durch** ein derart geführtes Drehjoch (31), dass dessen Drehachse (30) ausschließlich quer zur Ober- und/oder Auflageseite der Formeinheit (2) verläuft.
15. Vorrichtung nach einem der vorangehenden Ansprüche, **gekennzeichnet durch** Schlingmittel (14-17;22,29,30) mit linear quer zur Förderrichtung (51) zwischen der Formeinheit (2) und der Greifeinrichtung (34,35) angeordnete (16,17) und auf- und auseinanderführbare Schlingführungselemente (14,15), die zum Umfassen, Umgrenzen oder Umklammern der Telgstrang-Schenkelabschnitte (36b) beim einer Brezel-Knotenbildung dienenden Schlingvorgang ausgebildet sind.
16. Formeinheit (2) für eine Vorrichtung nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, dass die Positionierungsmittel (3,4;5) ein oder mehrere Förderbänder (3,4) und ein oder mehrere, mit diesem zusammenwirkende und/oder baulich integrierte Haltekörper (5) umfassen, wobei das oder die Haltekörper (5) in oder entgegen der Förderrichtung linear geführt sind.
17. Formeinheit (2) nach Anspruch 16, wobei mehrere solche Förderbänder (3,4) im Abstand nebeneinander verlaufend, und dazwischen eine Mehrzahl der Haltekörper (5) derart vorspringend angeordnet sind, dass letztere für den gebogenen Abschnitt (36a) des U-förmigen Telgstrangs (36) oder für den vom Knoten abgegrenzten, runden Mittelabschnitt des Brezelrohlings einen Halterungseffekt bilden, **dadurch gekennzeichnet**, dass die Haltekörper (5) vom Linearantrieb (10,1.1) in und entgegen

gen der Förderrichtung (51) geführt sind.

# Claims

1. Method of manufacturing a pretzel from a dough strand (36) bent into a U-shape with a mould unit (2, 6) holding the same, in which the dough strand (36) is held or grasped in the U-shape by means of dough strand positioning means (3, 4; 5) and is worked in combination with gripper means (34, 35) to form a pretzel blank (45) with a tied pretzel knot, wherein the gripper means (34, 35) grasp and hold the dough strand ends (36b), characterised in that the positioning means (3, 4; 5) are used to expand, tension and/or stretch the U-shaped dough strand (36), which is held in the mould unit (2, 6) at its ends by the gripper means (34, 35), by a predetermined degree of expansion (d), in that the positioning means (3, 4; 5) abutting or grasping or conveying the dough strand are moved or displaced in or opposite to the mould unit (2, 6) according to the degree of expansion (d).
2. Method according to claim 1, characterised in that the tying of the pretzel knot is carried out after displacement of the positioning means (3, 4; 5) according to the degree of expansion (d) and whilst retaining the tension of the dough strand thereby generated.
3. Method according to claim 1 or 2, characterised by tying guide elements (14, 15) which can be moved together and apart and which are used for encompassing, encircling or clasping the dough strand arm sections (36b).
4. Method according to one of the preceding claims, characterised in that the degree of expansion (d) is predetermined according to the type of dough.
5. Method according to one of the preceding claims, characterised in that, after tying of the pretzel knot, the positioning means (3, 4; 5) are used for displacing the curved central section (36a) of the U-shape of the dough strand (36) held in the mould unit (2, 6) and at its ends by the gripper means (34, 35), by a predetermined dough strand displacement distance (e) in the direction of the dough strand ends (36b) and/or gripper means (34, 35), in that the positioning means (3, 4; 5) abutting, grasping or conveying the dough strand (36) are moved or displaced in or relative to the mould unit (2, 6) according to the dough strand displacement distance (e), and thereafter the dough strand ends (36b) are placed with the gripper means (34, 35) on the section (36a) of the dough strand (36) bent in a U-shape.

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6. Method according to claim 5, characterised in that the dough strand displacement distance (a) is predetermined according to the customer's wishes.

7. Apparatus for the mechanical manufacture of pretzels for carrying out the method according to one of the preceding claims, having a device (1) for supplying U-shaped dough strands (36) into a downstream mould unit (2), which is formed for holding the supplied U-shaped dough strand (36) and for processing the same into a pretzel blank (45), having a pretzel blank discharge device allocated to an outlet of the mould unit (2), having a gripper device (34, 35), which is formed for grasping or holding the dough strand ends (36b) out of and/or into the mould unit (2), and which is linearly movable along a dough strand and pretzel blank conveying direction (51) between the supply and discharge device (1; 18, 19) and in a direction (38, 47) transverse thereto, and having means (14-17; 22, 29, 30) for tying a pretzel knot with the arm sections of the U-shaped strand (36) located in the mould unit (2), wherein the gripper device (34, 35) and the tying means (14-17; 22, 29, 30) are controllable by a control, and the mould unit (2, 6) is provided with dough strand positioning means (3, 4; 5) controllable by the control and linearly drivable (10, 11) and guided (9) in and opposite to the conveying direction (51), by means of which positioning means the dough strand (36) or pretzel blank (45) is movable entirely or partly relative to the gripper device (34, 35) holding the dough strand ends (36b), wherein the control is coupled on the input side to signal transmitters, which respond or relate to the position of the strand ends (36b), of the gripper device (34, 35) and/or of the tying means (22, 29, 30), and on the output side to the linear drive (10, 11) for the positioning means (3, 4; 5) for triggering the same, characterised in that the control may be set with a dough strand degree of expansion (d) according to which, when the dough strand ends (36b) are grasped by the gripper device (34, 35), the linear drive (10, 11) of the positioning means (3, 4; 5) may be triggered to expand or displace the dough strand (36) in the direction away from the gripper device (34, 35) holding the dough strand ends (36b).

8. Apparatus according to claim 7, characterised in that the control may be set with a dough-strand displacement distance (a) according to which, upon completion of the knot by the tying means (22, 29, 30) the linear drive (10, 11) of the positioning means (3, 4; 5) are so movable for displacement of the dough strand (36) in the direction (13) towards the gripper device (34, 35) holding the dough strand ends (36b) that the dough strand ends (36b) may be placed by displacement of the gripper device (34, 35) in the transverse direction (38) on the rest

of the dough strand (36a).

9. Apparatus according to one of the preceding claims, characterised in that in a starting phase, the linear drive (10, 11) of the positioning means (3, 4; 5) may be so triggered by the control that the ends (36b) of the U-shaped dough strand (36) located in the mould unit (2) come to rest on the discharge device (18, 19), and in a subsequent phase the linear drive (10, 11) of the positioning means (3, 4; 5) may be so triggered by the control that the ends (36b) of the dough strand (36) are pulled from the discharged device to the mould unit (2), wherein the gripper device (34, 35) may be so triggered by the control that it grasps the dough strand ends (36b), when its position may be fixed between the mould unit (2) and the discharge device (18, 19).

10. Apparatus according to claim 9, characterised by sensor means (20, 21) associated with the inlet of the control, which are disposed and formed in the intermediate region (46) between the outlet of the mould unit (2) and the inlet of the discharge unit (18, 19) in order to detect the dough strand ends (36b).

11. Apparatus according to one of the preceding claims, characterised in that the discharge device (18, 19) has an intermediate table (18) with conveyor or belt (18a), whose inlet is directly opposite to the outlet of the mould unit (2), and a downstream discharge table (19) with conveyor belt (19a), wherein the conveyor belt (18a) of the intermediate table (18) is formed to operate at different speeds.

12. Apparatus according to one of the preceding claims, characterised in that the gripper device (34, 35) and the tying means (22, 29, 30) are structurally and/or functionally integral with one another, in that the gripper device (34, 35) has two gripper elements (39a, 40; 41) associated with respective ends of the U-shaped dough strand located in the mould unit, which gripper elements are disposed on a common rotary yoke (31), which is rotatable by a rotary drive (29) controllable by the control and is linearly movable in the transverse direction (38, 47) from and to the dough strand (36) located in the mould unit (2).

13. Apparatus according to claim 12, characterised in that the rotary yoke (31) for the gripper elements (39a, 40; 41, 42) has two fixing places, which are arranged at a distance from one another corresponding to the distance between the ends of the U-shaped dough strand (36) located in the mould unit (2).

14. Apparatus according to claim 12 or 13, characterised by a rotary yoke (31) so guided that its axis of

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rotation (30) extends solely transverse to the upper face and/or contact face of the mould unit (2).

15. Apparatus according to one of the preceding claims, characterized by tying means (14-17; 22, 29, 30) with tying guide elements (14, 15) which are driven linearly transverse to the conveying direction (51) between the mould unit (2) and the gripper device (34, 35) and which may be moved together and apart, and which are formed for encompassing, encircling or clasping the dough strand arm sections (36b) in a tying operation for the formation of a pretzel knot.

16. Mould unit (2) for an apparatus according to one of the preceding claims, characterized in that the positioning means (3, 4; 5) comprise one or more conveyor belts (3, 4) and one or more holding bodies (5) cooperating therewith and/or structurally integral therewith, the holding body or bodies (5) being guided linearly in or opposite to the conveying direction.

17. Mould unit (2) according to claim 16, wherein a plurality of such conveyor belts (3, 4) are arranged extending adjacent to one another but spaced apart, and in between a plurality of holding bodies (5) are disposed projecting in such a manner that the holding bodies (5) form for the curved section (36a) of the U-shaped dough strand (36) or for the round middle section of the pretzel blank defined by the knot a mounting saddle, characterized in that the holding bodies (5) are guided by the linear drive (10, 11) in and opposite to the conveying direction (51).

#### Revendications

1. Procédé pour produire un bretzel à partir d'un boudin de pâte (36) cintré sous une forme en U, comportant une unité de mise en forme (2,6) retenant ce dernier, dans laquelle le boudin de pâte (36) est maintenu ou saisi sous la forme en U, à l'aide de moyens de positionnement (3,4 ; 5) du boudin de pâte, et, en combinaison avec des moyens de préhension (34, 35), est transformé en une ébauche de bretzel (45) avec un nœud de bretzel formé par entrelacement, les moyens de préhension (34,35) saisissant et retenant les extrémités (36b) du boudin de pâte, caractérisé en ce que l'on utilise les moyens de positionnement (3,4 ; 5) pour allonger, tendre et/ou étirer, d'une grandeur d'allongement déterminée (d), le boudin de pâte en U (36) retenu, à ses extrémités, dans l'unité de mise en forme (2,6), et par les moyens de préhension (34,35), en faisant se mouvoir ou en déplaçant dans ou par rapport à l'unité de mise en forme (2,6), dans une mesure correspondant à la grandeur d'allongement

(d), les moyens de positionnement (3,4 ; 5) qui s'appliquent contre le boudin de pâte (36) ou saisissent ce dernier ou le font avancer.

2. Procédé selon la revendication 1, caractérisé en ce que la formation du nœud de bretzel par entrelacement s'effectue après le déplacement des moyens de positionnement (3,4 ; 5) en correspondance avec la grandeur d'allongement (d) et sous conservation de la tension du boudin de pâte ainsi développée.

3. Procédé selon la revendication 1 ou 2, caractérisé par des éléments guides d'entrelacement (14,15) pouvant être rapprochés et écartés l'un de l'autre, qui sont utilisés pour entourer, ceindre ou enserrer les tronçons (36b) du boudin qui en constituent les branches, lors de l'opération de formation par entrelacement du nœud de bretzel.

4. Procédé selon l'une des revendications précédentes, caractérisé en ce que la grandeur d'allongement (d) est prédéterminée en fonction de la nature de la pâte.

5. Procédé selon l'une des revendications précédentes, caractérisé en ce que, après la formation du nœud de bretzel par entrelacement, on utilise les moyens de positionnement (3,4; 5) pour déplacer, par rapport aux extrémités (36b) du boudin de pâte ou aux moyens de préhension (34,35), le tronçon médian (36a), cintré en forme de U, du boudin de pâte en U (36) retenu, à ses extrémités, dans l'unité de mise en forme (2,6) et par les moyens de préhension (34,35), d'une grandeur de décalage (e), prédéterminée, du boudin de pâte en direction des extrémités (36b) du boudin de pâte et/ou des moyens de préhension (34,35) en faisant se mouvoir ou en déplaçant dans ou par rapport à l'unité de mise en forme (2,6), dans une mesure correspondant à la grandeur de décalage (e) du boudin de pâte, les moyens de positionnement (3,4 ; 5) qui s'appliquent contre le boudin de pâte (36) ou saisissent ce dernier ou le font avancer, et en déposant ensuite les extrémités (36b) du boudin de pâte, à l'aide des moyens de préhension (34,35), sur le tronçon cintré en forme de U (36a) du boudin de pâte (36).

6. Procédé selon la revendication 5, caractérisé en ce que la grandeur de décalage (e) du boudin de pâte est prédéterminée chaque fois d'après le souhait du client.

7. Dispositif pour la production mécanisée de bretzels, destiné à la mise en œuvre du procédé selon l'une des revendications précédentes, comportant une structure (1) pour amener des boudins de pâte (36)